

operation to be carried out on the work while in the fixture, whether planing, milling, slotting, etc., and how much stock is to be removed. A milling fixture, as a rule, must be made stronger than a planing fixture, because a milling cutter ordinarily takes a heavier cut than a planing tool. Many of the features often found on milling fixtures may be applied to planer fixtures with whatever change may be necessary on account of the particular operation required. As a rule, milling and planing fixtures are provided with a tongue or key in the base, for locating them on the machine table. Suitable lugs should also be provided for clamping the fixture to the platen.

The most commonly used fixture for planing, shaping, and milling is the vise. Standard vises are indispensable in planer or milling machine work or on the shaper, and by slight changes they can be used for a large variety of smaller pieces. The regular vise jaws are often replaced by false jaws, which may be fitted with locating pins and seats, and held to the vise the same as the regular jaws. Vises with false vise jaws are especially adapted for milling operations, but vises are not usually employed for long work, special fixtures being commonly used.

Planing Fixtures for Lathe Carriage Casting. — Assume that a set of planing fixtures for the piece shown in Fig. 24 is required. The work is a slide or carriage for a lathe. The finishing marks given on a number of the surfaces indicate where the work is to be finished. In the first place, it must be considered from which sides to locate, and *how* to locate and hold the work without springing it, and in what order the operations should be performed to best advantage. Fig. 25 shows a fixture for roughing out the ways on the bottom. The slide is located on three fixed locating points *A* and the sliding point *B*. This latter is adjustable in order to enable planing the slide as nearly as possible to uniform thickness. Sometimes, if the parts *A*, Fig. 24, bevel toward the ends, lugs *G* may be added; these can then be finished and used for locating purposes. The carriage, as shown in Fig. 25, is further located against the pins *C* in order to insure that the cross-slide of the carriage will be square with the bottom ways. The slide is brought up side-wise against the pin *D*, and then clamped down in convenient